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Note by the Secretary-General

The Secretary-General has the honour to transmit to the Security Council the twentieth quarterly report on the activities of the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) (see annex). It is submitted by the Acting Executive Chairman of UNMOVIC in accordance with paragraph 12 of Security Council resolution 1284 (1999) of 17 December 1999.

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Annex

Twentieth quarterly report on the activities of the United Nations Monitoring, Verification and Inspection Commission in accordance with paragraph 12 of Security Council resolution 1284 (1999)

I. Introduction

1. The present report, which is the twentieth[a] submitted in accordance with paragraph 12 of Security Council resolution 1284 (1999), covers the activities of the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC) during the period from 1 December 2004 to 28 February 2005.

II. Developments

2. During the period under review, the Acting Executive Chairman has continued the practice of briefing the respective Presidents of the Security Council, representatives of Member States and officials of the Secretariat on the activities of UNMOVIC. In February, he also travelled to Vienna for discussions with the Director General of the International Atomic Energy Agency (IAEA) and the Iraq Nuclear Verification Office. In addition, he has travelled to London and Paris for consultations with officials in the respective Governments.

3. As part of its ongoing investigations into the removal of items, equipment and materials from Iraq (mainly as scrap) that were subject to UNMOVIC monitoring, the Commission made enquiries of all of Iraq's neighbours whether any such items, equipment or materials had found their way into or through their countries. The responses of Jordan, Turkey and Kuwait have previously been reported, as has follow-up action in this regard in Jordan. Since then a communication has been received from the Permanent Representative of the Syrian Arab Republic confirming a previous statement to the effect that "no relevant scrap from Iraq had passed into or through Syria". No responses have been received as yet from the Governments of the Islamic Republic of Iran and Saudi Arabia.

4. UNMOVIC imagery analysts have continued the ongoing review of the status of sites subject to inspection and monitoring in Iraq. Of the 411 sites inspected in the period from November 2002 until March 2003, Commission experts have acquired and examined post-war high-resolution imagery covering 353 sites, including those considered the most important. As part of the examination and analysis, experts have determined that approximately 70 of the sites were subjected to varying degrees of bomb damage.

5. In previous quarterly reports, UNMOVIC noted the reported looting and razing of sites that contained dual-use equipment and materials subject to monitoring, some of which have been discovered outside Iraq. The continuing examination of site

[a] The Commission's 19 previous reports were issued as documents S/2000/516, S/2000/835, S/2000/1134, S/2001/177, S/2001/515, S/2001/833, S/2001/1126, S/2002/195, S/2002/606, S/2002/981, S/2002/1303, S/2003/232, S/2003/580, S/2003/844, S/2003/1135, S/2004/160, S/2004/435, S/2004/693 and S/2004/924.

imagery has revealed that approximately 90 of the total 353 sites analysed containing equipment and materials of relevance have been stripped and/or razed. Commission experts have also noted that repairs and new construction have begun at 10 sites.

III. Other activities

6. The Commission has continued its work on the draft of the compendium of Iraq's proscribed weapons and programmes with the intention of completing its first draft in March 2005. Some preliminary lessons drawn from this ongoing work reflecting the progress achieved so far have been presented to the College of Commissioners.

Small quantities

7. In its last quarterly report (S/2004/924), the Commission mentioned its intention to examine adjustments to the focus of the monitoring procedures for Iraq with respect to small quantities of weapons of mass destruction. While they may not be of military significance, they may be of potential interest to non-State actors. The Acting Executive Chairman further explained the Commission's thoughts during informal consultations of the Council on 7 December 2004 in the context of the Council's review of that report.

8. A working group of UNMOVIC technical experts was convened to prepare an initial study concerning this issue, and to review the history of incidents involving small quantities of biological and chemical agents. The study would serve as the basis for a more in-depth assessment of the matter within UNMOVIC, including possible implications for ongoing monitoring and verification in the chemical and biological areas. The group considered the types and range of small quantities of agents; the capabilities needed for the acquisition of such quantities, including quantity of precursors and capacity of equipment; and the possible chokepoints for acquiring, producing and transporting small quantities of agents for weapons of mass destruction or associated primary precursors.

9. Among the potential chokepoints identified were acquisition of materials, either precursor chemicals or biological material, as well as the agents themselves; practical expertise and experience in the production/synthesis of chemical or biological weapons and associated precursors; technical knowledge of the appropriate release or dissemination mechanisms for the agents for substantial effectiveness; minimum safety and personal protection equipment; and chemical agent antidotes for certain chemical weapon agents.

10. It was noted that the ongoing monitoring and verification regime for Iraq included within its scope the monitoring of small-scale production activities in the biological and chemical disciplines and that relevant materials (except for growth media) were currently subject to notification through the export/import monitoring mechanism approved by the Security Council in resolution 1051 (1996). However, it was possible that small quantities of such materials could be acquired through clandestine procurement networks. A possible source of chemical precursor material could also be the chemical mixtures that are traded internationally and exempted from export control on the basis of a concentration threshold. Accordingly, and as an initial observation, the group felt that some changes in emphasis and reporting

thresholds outlined in the ongoing monitoring and verification regime might be needed. The regime may require more activity-based monitoring of sites and less reliance on specific quantities (number, volume etc.) as triggers; that is, it would be "quantity independent".

Information technology system

11. UNMOVIC continues to enhance its information technology system for inspectors and analysts. The integration of large volumes of high-resolution satellite imagery and the site inspection database has reduced the time required to plan, prepare and conduct inspections. Data collected during inspections is entered into an inspection reporting application, which then contributes to the production of inspection reports. The site database is automatically updated with the latest inspection data and is thus available for the next inspection.

12. A secure electronic archive system has brought the searching for and retrieval of information up to the latest standards. Detailed, in-depth search tools allow for more focused queries with more manageable results in a much quicker time frame. The latest generation of analytical tools also makes it possible to graphically display linkages between a large number of database elements (sites, materials, equipment etc.). These enhancements have made UNMOVIC more responsive and efficient in its analysis, planning and operations. An appendix to this report sets out in more detail the Commission's information technology system and capabilities.

Biological seed stocks

13. In its last quarterly report to the Council, the Commission stated that it shared the concerns raised in the report of the Iraq Survey Group with respect to the fate of biological agent seed stocks in Iraq and that the issue remained a verification concern.

14. The term "seed stock" is used to refer collectively to reference strains of micro-organisms provided by culture collections (a unique library of strains), as well as to master and working seed stocks. A micro-organism used as a reference strain is one which has been isolated and its characteristics have been defined. A reference strain of micro-organism is cultured and used to produce vials of master seed. One vial of reference strain may produce many more vials — possibly a hundred — of master seed. Master seeds are usually maintained in order to ensure that all successive preparations of products are derived from the source to minimize the chance of mutation and/or variation of a product. Each master seed vial can be used to produce many working seed vials. Cultures of working seeds are then used in biological production processes.

15. In 1991, Iraq declared to the Special Commission that it had obtained 103 vials of bacterial isolates (reference strains) from foreign suppliers, and provided details on the individual types, source, year of importation and quantities. Of the 103 imported vials, 13 were declared to have been used, while 90 were provided to the Special Commission unopened. As can be seen from the table, a number of vials of isolates were used by Iraq in its biological weapons programme.

Micro-organism	*Number of declared vials used*	*Number of sealed, unused vials given by Iraq to the United Nations in 1991*
Bacillus anthracis	4	16
Bacillus megaterium	1	6
Bacillus subtilis	1	5
Clostridium botulinum A	3	8
Clostridium perfringens	3	15

The non-pathogenic *Bacillus megaterium* and *Bacillus subtilis* share some characteristics with *Bacillus anthracis* and may be substitutes for the actual live agent for testing purposes, for instance in production calibration or dissemination studies. Iraq also declared the import of a number of pathogenic and non-pathogenic isolates that were acquired within, but not used in, its biological weapons programme. Forty vials of such isolates were handed over to the Special Commission, unopened. Iraq also declared that one vial of *Brucella melitensis* (pathogenic) had been used in academic research.

16. The Special Commission was able to verify parts of Iraq's declarations with respect to its use and subsequent destruction of master and working seed stocks. However, the Special Commission had noted that accounting for all seed stock vials obtained from open vials would be virtually impossible as they could have been widely distributed as secondary seed stock throughout Iraq.

17. As a consequence, the issue remains as part of the residue of uncertainty with respect to the continued existence in Iraq of seed stocks that could possibly be used in the future for the production of biological weapon agents. Given its unresolvable nature, the issue could best be dealt with through monitoring to detect inter alia any possible future activity associated with biological weapon agent production or significant related laboratory research work.

IV. Other issues

Field offices

18. UNMOVIC retains a core staff of nine local nationals in Baghdad who maintain the existing offices, laboratories and other equipment at the Canal Hotel. As a result of their ongoing inventory of equipment in the Canal Hotel in Baghdad, UNMOVIC has been able to write off lost and destroyed equipment through the United Nations Headquarters Property Survey Board.

19. The Cyprus field office has been reduced to four staff members. It continues to provide for storage and maintenance of inspection and monitoring equipment, and could be used as a staging area for staff and logistics support should inspections resume. Whenever appropriate, the staff of the field office has continued to work with Customs in Larnaca, facilitating shipments of other United Nations agencies, and to provide logistics support to flight operations of the United Nations Assistance Mission for Iraq (UNAMI) and to the United Nations Peacekeeping Force in Cyprus (UNFICYP). The Acting Executive Chairman visited the field office early in December and discussed the status of the field office in Cyprus with

the Permanent Secretary of the Foreign Ministry, who gave assurance of support. The Acting Executive Chairman also reviewed the new office space at the airport.

Contracts with laboratories providing analytical services

20. The Procurement Service has undertaken the extension of existing contracts to provide analytical laboratory services during 2005.

Staffing

21. Core UNMOVIC staff in the Professional category at Headquarters at present total 51 weapons experts and other personnel drawn from 25 nationalities, 9 of whom are women.

Technical visits, meetings and workshops and assistance to United Nations bodies

22. Two members of staff attended the ninth Conference of States Parties to the Chemical Weapons Convention, as observers. In addition, they held discussions with experts of the Organization for the Prohibition of Chemical Weapons on declaration formats and visited the Organization's laboratory and equipment stores to discuss sampling and analytical methods as well as equipment storage methods to ensure long-term viability.

23. At the request of the Office for the Coordination of Humanitarian Affairs and the Cartographic Section of the Department of Peacekeeping Operations, UNMOVIC imagery interpretation experts have been helping a number of United Nations agencies through the processing of satellite imagery provided to them covering the Indian Ocean area affected by the December 2004 earthquake and tsunami. UNMOVIC experts have created a master set of Landsat enhanced satellite images to provide the basis for the accurate mapping and analysis of the region. The experts processed 84 Landsat-7 tiles covering the entire area as well as 250 high-resolution detailed images of parts of the affected area and 27 maps of the western part of Sumatra. All the data is managed in a geographic information system and made available online to the relevant agencies.

Training

24. A two-day seminar was conducted in New York on 15 and 17 February to obtain a better understanding of the infrastructure, equipment and materials that could be involved in small-scale production of chemical and biological warfare agents.

25. The preparations have been completed for the second missile enhanced training course to be conducted in Germany from 7 to 18 March. The main objective of this course is to develop with the roster inspectors practical skills for inspection and monitoring of dual-use production equipment and capabilities.

26. UNMOVIC conducted an in-house seminar for its biological experts in conjunction with a biotechnology company on DNA-based analysis as a potential verification tool. The experience gained by law enforcement and human rights monitors in processing large quantities of DNA-based samples can be applied to DNA extracted from plants and micro-organisms. The latest advances in DNA extraction and processing technologies were discussed and how these techniques can be applied to the activities of UNMOVIC.

V. College of Commissioners

27. The UNMOVIC College of Commissioners convened in New York for its eighteenth regular session on 23 and 24 February. As on previous occasions, observers from the International Atomic Energy Agency and the Organization for the Prohibition of Chemical Weapons attended.

28. The Acting Executive Chairman briefed the Commissioners on the activities of UNMOVIC since their last meeting. Presentations were made to the College on some lessons learned in the framework of the compendium, on work done by Iraq on the smallpox vaccine, on the results of the panel of biological experts convened in 2004 to discuss possible relevant revisions to the monitoring plan and on the Commission's imagery capabilities.

29. The College welcomed the comprehensive oral statement of the Acting Executive Chairman in which he dealt inter alia with confirmation of disarmament, ongoing monitoring and the possible need for end-use verification of imports of dual-use items into Iraq for a defined period. It also welcomed the presentations made. There was interest in convening a panel of experts to consider possible revisions to the missile provisions of the monitoring plan. The College reiterated its support for the UNMOVIC roster and the maintenance of the existing experience and expertise.

30. The College discussed the issues raised by the Chairman in his oral statement which might affect the mandate of the Commission, noting the work of the Iraq Survey Group and recent developments, including the election held in January in Iraq. The College recognized that many of the issues, including the mandate, were ultimately matters for the Security Council to decide. The College encouraged the Chairman to continue to take a proactive approach within the current mandate and supported the Commission's ongoing activities, such as work on the compendium, examination of revisions to the ongoing monitoring and verification plan and training.

31. It was decided to hold the next meeting on 24 and 25 May 2005 in New York.

32. In accordance with paragraph 5 of resolution 1284 (1999), the Commissioners were consulted on the contents of the present report.

Appendix

UNMOVIC information system

Introduction

1. Following the establishment of the United Nations Monitoring Verification and Inspection Commission by the Security Council in December 1999, it was quickly realized that, in order to analyse and draw conclusions from the eight years of work by its predecessor, the United Nations Special Commission, and prepare for future inspections in Iraq, a much more dynamic information technology system would be required. It was also recognized that much of the data previously provided by Iraq, as well as that collected by the Special Commission, contained some very sensitive as well as proprietary information that required careful handling and a secure storage medium.

2. Accordingly, UNMOVIC constructed both a secure local area network and a wide area network that are "stand-alone", that is, have no linkages to any outside computer networks. The system utilizes encryption between computers and networks.

3. When the information technology system was designed, care was taken to ensure that the system was multifaceted and able to respond to the changing and diverse needs of the substantive disciplines.

4. The evolution to the current system in use took several steps, each building botn on what UNMOVIC inherited and on its own accomplishments. The work was completed within the framework of an information technology strategy adopted by senior management.

Overview of the UNMOVIC information system

5. The information system currently in use supports UNMOVIC activities in a variety of ways, from the ability to store large amounts of data submitted, to the analytical processing and comparison of new information against historical data. The system itself consists of five main subsystems, which work closely together to create a flexible, responsive information system. The five subsystems are: Intranet, archives and search engine; site, inspection and declaration system; the geographical information system; analytical tools and the underlying information and communication technology infrastructure.

Intranet, archives and search engine

6. As there are a large number of information tools available, a central access portal (Intranet) was built to give inspectors and analysts a consistent starting point to access all available information and to receive information about the system as well as updates.

7. The UNMOVIC archives are first and foremost the physical collection of documents inherited from the Special Commission and all documents resulting from the execution of the mandated tasks of UNMOVIC. This expanding collection occupies about 1,500 linear feet, roughly 1 million pages and a wide variety of videos, photographs and audio tapes from inspections as well as overhead imagery.

8. A substantial part of this information was produced electronically and is not always available on paper. This includes some declarations made by the Government of Iraq to UNMOVIC, information collected during the inspections, analytical reports produced by UNMOVIC staff members, and imagery and data entered into the UNMOVIC databases. The UNMOVIC electronic archives represent over 900 gigabytes of data, enough to fill 1,300 CD-ROMs.

9. In addition to the daily ongoing work, documents are still being categorized, translated and digitized, many of which were acquired from the Commission's predecessor in paper form.

10. To manage this collection, UNMOVIC uses an off-the-shelf document management system which allows UNMOVIC to systematically catalogue every record produced and received, and to manage the electronic and paper records.

11. Finding a particular document can be achieved in one of two ways:

(a) Searching the title of a document or any other additional information (metadata) that was stored together with the document at the time the document was archived. The additional information that can be searched may consist of the document number, notes, site number the document pertains to, the particular physical repository, creation date, archived date, disciplines and document type (multimedia, inspection reports, Iraqi documents etc.) and author.

(b) Searching for a document that contains a particular word or concept. A simple word search has very serious limitations when dealing with documents containing complex technical information. The UNMOVIC search engine also looks at the relationships between all the words of all the documents and weighs them according to a sophisticated algorithm. When searching for a particular word, the search engine also catalogues and analyses other words that appear together with the search word in all other documents. The result set, therefore, would also include documents without the search word, but containing the words that are statistically related to the search word. The result set can be narrowed or broadened according to the user's wishes.

(c) The UNMOVIC search engine can produce "topic sets" or predetermined searches. For example, if an inspector or analyst searches for the word "anthrax" appearing in the same paragraph of the document as the word "vaporizer", but not related to the word "agricultural", he or she can do that directly. There are currently three topic sets in use at UNMOVIC; they were custom-designed in cooperation with the analysts and inspectors.

(d) The UNMOVIC search engine is also able to produce knowledge trees, which are hierarchical representations of the data, allowing the user to select folders and subfolders containing the desired information. These knowledge trees can be based on metadata fields (such as weapons discipline name or type of record) or based on abstract concepts. The knowledge trees greatly enhance the ability of UNMOVIC to cross-examine information, distinguish hidden patterns and quickly access details. Some of the knowledge trees used to refine and narrow the search for specific information are, for example, equipment by supplier company, equipment by material of construction, or equipment by weapons discipline. Additionally, the knowledge trees are used to refine the search for specific information, for example, by type of document (inspection report, declarations, open source information etc.) or by the physical location of the document.

Site, inspection and declaration system

12. The UNMOVIC information system deals with more than documents. A significant amount of information about facilities capable of producing or using materials falling under the Commission's mandate is stored in a large database. The UNMOVIC database was designed to be flexible and adaptive; it can be changed by modifying data in the database without having to resort to reprogramming the system.

13. The site database can be populated (filled/updated) in several ways. A new site information set can be created on the basis of information received, for example in an Iraqi declaration. This information relates to the physical aspects of the site (coordinates, address, location, buildings, equipment, materials, processes, capabilities etc.) and also to the internal and external organization of the site (point of contact, owner, parent organization etc.). Each time a new piece of information is entered or added to the database, a reference to an archived document or source of the new information can be added. Thus, most information in the database has documentary evidence (or a "paper trail") associated with it.

14. The UNMOVIC database includes information from inspections. The inspection data is closely related to the site information. This allows the site database to be fed directly from inspection results.

15. The site and inspection database is also used for planning, operational and analytical purposes. Inspection and monitoring schedules can be generated on the basis of past inspections. "Pre-inspection" documents can be generated to assist in the planning of missions and also to produce "inspection packages" to be used by the inspectors during a mission.

16. At the end of an inspection, the inspectors enter the data collected into the inspection report system. This system is then used to generate standard inspection documents. All documents collected during the inspection are imported into the archives. The site database is updated with the latest inspection findings and changed data is "tagged" with the inspection number, thereby providing a reference to the source of the data. The old data is stored in the database history and can be used to "backtrack" the information.

17. UNMOVIC has recently prototyped an application to collect declaration data electronically. In the past, Iraq's declarations were submitted on paper or electronically in a non-structured format, which made the analysis labour intensive. The new declaration system is fully integrated in the site database and inspection system and will provide for the automatic detection of changes (differential analysis) in declared information. In addition, the information provided in the first declaration can be used to feed the site database. This can significantly simplify the process of the initial population of the site data.

18. The UNMOVIC Intranet contains tools for performing detailed searches of the contents of databases:

- **Interview search system**. An application through which inspectors and analysts can search a series of past interviews and discussions with Iraqi personnel. They may search the actual text of the interviews and also find interviews with a particular participant.

- **Building information**. A search application that allows the user to view building information at a site. The inspectors and analysts can input the site number and then select the desired buildings or simply type in the building number directly. This is a complex search that retrieves the following information: basic building information, such as name, current use, description, photographs, location etc., and a list of equipment by location within the building, containing links and detailed information on each piece of equipment, including photographs, dimensions, uses, category, status etc. UNMOVIC is further extending this part to include links to past inspection reports that contain this item, in an attempt to create an equipment history; a list of materials, including suppliers and customers for each material, quantity, activities that used this material, and capabilities; and activities conducted in the building, including personnel involved, type of activity, material used etc.

- **Equipment search**. UNMOVIC has also developed an equipment search system that provides the user with the ability to perform accurate and specific searches for information contained in the "equipment" portion of the database, including the ability to narrow the search by site(s), manufacturer, equipment type, status of the equipment, weapons discipline, quantity, dimensions, serial number, model, description, comments, supplier, location within the site etc.

Geographic information system

19. High-quality satellite imagery has increasingly become commercially available. Such imagery was relied on by the inspectors in the planning and execution of missions. In order to strengthen the inspection process, UNMOVIC has developed a geographic information system which fully integrates imagery and maps with the site database. An analyst can expand a map of Iraq to the level of individual buildings and query the contents of a particular building. An inspector can use the same tool to plan a mission. The UNMOVIC geographical database contains almost 1 million geographical features like highways, ditches, land subject to flooding, wells, pipelines etc. Some of this data can be invaluable during the preparation of inspection missions.

20. The easily accessible high-quality imagery allows UNMOVIC to periodically procure and process new imagery of the same location. This allows analysts to perform "change detection" and analysis of major infrastructure at sites so that modifications can be identified and the database updated to improve inspection planning.

21. The combination of high-quality digital elevation models and satellite imagery can produce virtual 3-dimensional renditions of a site and surrounding landscape, thereby giving the inspectors an additional operational tool.

Analytical tools

22. Complex information systems make it difficult to find and correlate data, and for this reason, UNMOVIC utilizes analytical tools used by law enforcement agencies to find relationships between data elements in the database. The system can highlight linkages between seemingly unrelated entities. For example, it can show that linkages exist between sites by identifying that they have similar equipment or share the same personnel.

23. A large amount of monitoring data generated by remote sensors and cameras from different sites can be collected to a central depository. Specialized software enables the inspectors to quickly and efficiently review and authenticate that data. The monitoring equipment can be remotely accessed and controlled, allowing for real-time monitoring.

24. In order to ensure a rapid deployment of inspectors, UNMOVIC has set up a fully functional smaller version of the information system for training purposes. The inspectors on the roster as well as headquarters staff are being trained in the use of the systems used in UNMOVIC.